

EXHIBIT

F – Part II

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3. Admixture manufacturer's certificate stating the maximum water soluble chloride content in the concrete, percent by weight of cement, the use of the admixture will yield.
4. BSA or MEA approval for the non-shrink grout.
5. Concrete producer's certificate must be presented at site before concrete is placed in accordance with paragraph 27-605 (a) (5) of the Building Code.
6. Submit certified U.S. Government laboratory test report for the following performance criteria of the integral waterproofing admixture:
 - a. Admixture produces 100% impermeable concrete, at the end of one year test period, under a water pressure of at least 20 psi.
 - b. Admixture increases the compressive strength of concrete.

D. Manufacturers' Instructions:

1. Admixture manufacturers' directions for use of each admixture.
2. Waterstop manufacturers' instructions for proper installation of waterstop, including manner in which splices are to be made.
3. Manufacturers' installation instructions for all miscellaneous items.
4. Air Entrainment Test Reports (ASTM C260).

E. Field Service:

1. Field service shall be provided, upon 5 days notice, by the manufacturer of the high range water-reducing admixture to assist the Contractor in obtaining the maximum benefits of the product under the prevailing job site conditions. In addition, the representative shall attend the pre-installation conference with the Engineer and the Contractor not later than 10 days prior to the beginning of the installation of the hardener. The Contractor shall furnish an agenda to all attendees 10 days prior to the meeting. Detailed requirements for the admixture including the concrete requirements for the admixture including the concrete mix design, equipment, placing and finishing techniques

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and curing methods shall be discussed and agreed upon.

F. Test Reports: Submit preliminary test results at least three weeks prior to the beginning of the work. In addition to the test reports specified under "Quality Control", submit the following from the testing laboratory to the Architect:

1. Preliminary Design Mix Reports (ACI 301).
2. Aggregate Soundness Test Reports (ASTM C88).
3. Aggregate Staining Test Reports (ASTM C641).

G. Manufacturers' data for all products.

1.04 PRODUCT HANDLING

A. Comply with ACI 301, Chapter 2, Paragraph 2.5.

1.05 ENVIRONMENTAL CONDITIONS

- A. Cold Weather Concreting: Refer to Part 1, paragraph "Standards."
- B. Hot Weather Concreting: Refer to Part 1, paragraph "Standards."

1.06 QUALITY CONTROL

A. Concrete Mix Designs:

1. All mix designs shall be proportioned in accordance with Chapter 3 of ACI 301. Submit mix designs on each class of concrete for review on the Mix Design Submittal Form attached at the end of the specification.
2. In addition to the tests required to establish the suitability of materials, make one test for each design mix to verify that the total chloride (Cl) ion content and the total sulfate (SO₄) content of each mix is within the specified limits. Perform chloride tests in accordance with "Standard Method of Sampling and Testing for Total Chloride Ion in Concrete" as contained in Report No. FHWA-RD-77-85 published by U.S. Department of Transportation, Federal Highway Administration. Perform sulfate (SO₄) tests in accordance with ASTM C114.
3. Have a representative present at the laboratory when the preliminary tests are made. Whenever a change of brand or source for any of the concrete ingredients

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occurs, additional "preliminary tests" will be required and the cost of these tests shall be borne by the Contractor.

4. Proposed mix designs, and supporting data will be subject to the review and approval of a testing agency engaged by the Owner.

B. Plant and Field Tests and Inspection

1. Concrete work will be subject to detailed inspection and tests at the plant and in the field. Inspection, field and laboratory tests of concrete taken from the job will be made by a testing laboratory engaged by the Owner, without expense to the Contractor. The Contractor may pay for any additional cylinders due to early stopping.
2. Facilitate the work of, and cooperate with the inspectors at all times. Notify the inspectors when formwork and reinforcing steel is in place in order to facilitate inspections. Do not place concrete until these inspections have been completed and all deficiencies reported by an inspector have been corrected to the inspector's satisfaction. Concrete placed prior to approval is subject to removal.
3. At the start of the Project, at least once each month or when new bulk materials are delivered to the batching plant for use on the Project, the Owner's Testing Laboratory will check the following for compliance with the Contract Documents:
 - a. Cement
 - b. Aggregate
 - c. Admixtures
4. The Owner's Testing Laboratory will supply all molds required for tests as described below, using molds of the same type and manufacture for making all test specimens. If field tests performed by the Owner's Testing Laboratory show excessive slumps or other violations of the Contract Documents, the entire batch of concrete from which the sample in question was taken will be rejected for use and shall be removed from the site at the Contractor's expense. The Owner's Testing Laboratory will inspect all concrete operations in the plant and in the field. A record of such inspection will be

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submitted to the Architect, covering the quality and quantity of concrete materials, mixing and placing of concrete, concrete formwork, placing of reinforcing steel and the general progress of the work.

5. If ready-mix concrete is used, each load of concrete arriving at the job shall be accompanied by a delivery ticket which shall be subject to checking by the Owner's Testing Laboratory at the plant and field and which shall contain the following information:
 - a. The strength of the mix of concrete being delivered.
 - b. The type of coarse aggregate.
 - c. The exact time the cement and aggregate were discharged into the delivery truck. If upon reaching the job the concrete cannot be placed within the time limits stated, or if the type of concrete delivered is incorrect, the inspector will reject the load for use, and it shall be removed from the site at the Contractor's expense.
 - d. List of admixtures.
6. Batch Plant Inspection: At the start of the Project and at least once each month until the completion of the concrete work, the Owner's Testing Laboratory will observe and evaluate the following for compliance with the Contract Documents:
 - a. Condition of batching equipment.
 - b. Condition of materials.
 - c. Inspect aggregate stockpiles and storage and bring to the attention of the concrete producer any practices which are causing segregation or contamination within the stockpiles.
 - d. Type of materials used.
 - e. Inspect trucks used to transport concrete to assure that they are clean and in condition to mix and to deliver a uniform mix.

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- f. Mixing time, delivery time.
 - g. Additional pertinent controls; depending on weather, job conditions, and other factors affecting the Work.
7. Chloride and Sulfate: The testing laboratory will take specimens of each class of concrete and will perform one test for each 100 cu. yds. to verify that the total chloride ion content and the total sulfate content are each within the specified limits. As soon as the concrete is no longer plastic, but in no event more than 24 hours after placement, the testing laboratory will perform tests in accordance with the procedure herein specified under Paragraph 1.06.A.2.
8. Compression Tests: The testing laboratory will take specimens of each class of concrete from different locations on the job as follows:
- a. At least four (4) specimens for each 50 cu. yds. or fraction thereof of each class of concrete and in any case not less than four (4) specimens for any one day's operations.
 - b. In addition, concrete test cylinders shall be made from concrete taken out of the bucket, hopper or forms, as directed by the engineer designated for controlled inspection. These test cylinders shall be separate and distinct from those made from the mixer, and shall be made from the same batch and cured and tested in the same manner as described for the samples taken from the mixer. The number of test cylinders made from concrete taken out of the bucket, hopper or forms shall be a minimum of one set of four (4) cylinders for every 150 cu. yds. or fraction thereof for each class of concrete mixed in any one day's concreting; and, when concrete is being placed directly from the mixer into the forms without any intermediate conveyance, the additional cylinders will not be required.
 - c. Test specimens will be taken at pouring locations to give a fair

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average of the concrete in the part
of the construction indicated.

- d. Samples will be obtained in accordance with ASTM C172.
 - e. The testing laboratory will conform to ASTM C31 in making, curing and subsequently handling test specimens, except as modified herein. Specimens will be tested in accordance with ASTM C39.
 - f. The cylinders will be placed in laboratory storage under moist curing conditions at approximately 70 degrees F. within 24 hours after molding and maintained therein until tested. One specimen of each set will be tested at seven days. Three cylinders of each set will be tested at 28 days. If the seven day strength is deficient, the Contractor will be notified.
9. Air Content: Test in compliance with ASTM C173.
- a. Air-Entrained Concrete: First truck and every third one thereafter.
 - b. Concrete Not Air-Entrained: Only as directed by the Architect.
10. Unit Weight: Test in compliance with ASTM C567.
- a. First truck everyday and each sample for cylinders.
11. Slump: Test in compliance with ASTM C143.
- a. First truck each day and each sample for cylinders. Provide slump cone and rod for use on the job at all times.
12. The Owner's Testing Agency will perform other testing and inspections as required by the Controlled Inspection provisions of the New York City Building Laws.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Portland Cement: ASTM C150, Type I. Use only one brand of cement from one mill throughout the work unless otherwise approved by the Architect.

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The alkali content shall not exceed 0.6% unless the manufacturer certifies that no alkali reactivity is produced with the proposed combination of materials when tested in accordance with ASTM C227.

B. Admixtures

1. Air-Entraining: Conform to ASTM C260; providing one of the following:
 - a. "MB-VR" (Master Builders Company).
 - b. "Darex AEA" (Construction Products Division, W.R. Grace & Company).
 - c. "Sika-Aer" (Sika Corporation).
 - d. "Air-Mix" (Euclid Chemical Co.).
2. Water Reducing (Plasticizing): Comply with ASTM C494, Type A, except as modified by local codes. All structural concrete shall contain a water reducing (plasticizing) admixture; one of the following:
 - a. "Eucon WR-75" (Euclid Chemical Co.).
 - b. "Pozzolith 200N" (Master Builders Co.).
 - c. "Plastocrete 160" (Sika Chemical Corp.).
3. High Range Water Reducing (Plasticizing): Comply with ASTM C494, Type F, except as modified by local codes. Structural concrete for columns, pumped concrete, concrete for industrial slabs, synthetic fiber concrete, architectural concrete, concrete required be watertight or concrete with a water/cement ratio below 0.50 shall contain the specified high-range water-reducing admixture (superplasticizer).
 - a. "Eucon WR-37" (Euclid Chemical Co.), or approved equal.
4. Other Admixtures: Use only with the prior written approval of the Architect. Admixtures submitted for Architect's approval shall be certified in writing by the manufacturer to be in compliance with ASTM C494. Do not use any admixtures which contain chlorides. Calcium chloride thiocyanates or admixtures containing more than 0.05% chloride ions are not

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permitted.

- C. Water: Conform to ACI 301, Chapter 2, Paragraph 2.3.
- D. Fine Aggregate
 - 1. For Uses Not Otherwise Specified: ASTM C33.
- E. Coarse Aggregate for Normal Weight Concrete: ASTM C33
 - 1. Maximum size of coarse aggregates not more than one-fifth of narrowest dimension between sides of forms, one-third of depth of slabs, nor three-fourth of minimum clear spacing between reinforcing bars.
 - 2. For Lightweight Concrete:
Rotary kiln produced expanded shale, slate, or clay conforming to ASTM C330, grading from #4 to 3/4 inch with the following additions: when tested in accordance with ASTM C666, concrete of six bas per cu. yard and approximately 6% air made with the aggregate shall have a minimum durability factor of 90% and that the tensile splitting strength equals 6.7 times the square root $F'c$ when established in accordance with ASTM C496.

Provide weight range between 110-115 pcf.
Aggregate for Lightweight Concrete Fill:
Rotary kiln produced expanded shale, slate, clay or slag conforming to ASTM C330.
- F. Metal Reinforcement: ASTM A615 grade as shown on Drawings.
 - 1. For fabrication tolerances conform to ACI 301, Chapter 5, Paragraph 5.4.
 - 2. All reinforcing bars having assigned positions shall have distinguishing marks plainly indicated thereon, which marks shall agree with those given on the shop drawings relating to or calling for the bars.
- G. Welded Wire Fabric: ASTM A185, size shown on Drawings.
- H. Clear Curing and Sealing Compound (VOC compliant): The compound shall have 30% solids content minimum, and will not yellow under ultra violet light after 500 hours of test in accordance with ASTM C4587 and will have test

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data from an independent testing laboratory indicating a maximum moisture loss of 0.039 grams per sq. cm. when applied at a coverage rate of 300 sq. ft. per gallon. Product shall be "Super Diamond Clear VOX" by the Euclid Chemical Co. or approved equal. Use this curing agent for all slabs to remain exposed (except slabs for parking decks), or to receive mastic adhesive for floor finish.

- I. Sealer/Dustproofers (VOC Compliant): The compound shall be a water-based acrylic sealer and shall not yellow under ultra violet light after 500 hours of test in accordance with ASTM C4587. Use this sealer just prior to job completion on all interior slabs that are to remain exposed except at slabs for parking decks. Product is as follows:
 - a. "Floor Seal VOX" by the Euclid Chemical Co.
 - b. "Lapidolith" (Sonneborn Building Products, Inc.).
- J. Expansion Joint Filler Strips: ASTM D1752.
- K. Formwork
 - 1. For unexposed surfaces and rough work, use Exterior Type Douglas Fir, Grade B-B, (Concrete Form) Plywood, conforming to NBS PS-1, minimum 3/4 in. thick, or undressed lumber, No. 2 common or better. Before reusing forms, withdraw nails and thoroughly clean surfaces to be in contact with concrete.
 - 2. For exposed surfaces not otherwise specified use Special exterior Type Douglas Fir, Grade A-B plywood, conforming to NBS PS-1, minimum 3/4 in. thick and constructed so that finished concrete will be straight, smooth, dense, free from honeycombs, bulges, or depressions. Keep joints between plywood sections to a minimum and make tight and strongly backed so that adjoining edges remain flush and true. Unsightly joint marks will not be permitted.
- L. Form Ties: For securing forms where surfaces will be exposed in the finished work, use tie screws with removable plastic cones, removable bolts, special removable tie wires or Series 300 stainless steel snap ties. For all other forms, use either bolts or wires. Use ties of such type that when forms are removed, no metal is closer than 1-1/2 in. from the finished concrete

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surface.

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2.02 MIXES

A. Proportioning of Concrete

1. Assume full responsibility for the strength, consistency, water-cement ratio, and handling of concrete. Design mixes in accordance with ACI 211.1 of ACI 211.2.
2. Water/Cement Ratio: All concrete subject to freezing and thawing shall have a maximum water/cement ratio of 0.50 (4000 psi at 28 days).
3. Adjust consistency of any mix to allow for specific placing conditions. The slump of concrete filling small, thin complicated forms shall be greater than for large masses, the degree of slump being governed by the least dimensions of the form. All concrete containing the high-range water-reducing (HRWR) admixture (superplasticizer) shall have a maximum slump of 9" unless otherwise approved by the Architect. The concrete shall arrive at the job site at a slump of 2" to 3", be verified, then the high range water-reducing admixture added to increase the slump to the approved level. All other concrete shall have a maximum slump of 4". Determine slumps in accordance with ASTM C143.
4. Measure materials for concrete by weighing. Cement and water shall be measured within $\pm 1\%$ of the required amount. Aggregates shall be measured within $\pm 2\%$ of the required amount. Admixtures shall be dispensed within $\pm 3\%$ of the indicated amount.
5. Watertight Concrete: All concrete listed on the drawings as being watertight shall have a maximum water/cement ratio of 0.45 and include the specified HRWR admixture.
6. The concrete shall also have an air content of $6\% \pm 1.5\%$. This concrete must be well cured so that it is kept continuously moist and above 50 degrees for seven (7) days.
7. For pumped concrete comply with ACI 304 Chapter 9. Concrete must contain the specified HRWR admixture.

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PART 3 - EXECUTION

3.01 FORMWORK

A. GENERAL

1. Forms shall conform to the lines, dimensions and shapes of concrete shown providing for openings, recesses, keys, slots, beam pockets and projections as required.
2. Make forms clean and free of foreign material before placing concrete.

B. DESIGN OF FORMWORK

1. Comply with ACI 301, Chapter 4, Paragraph 4.2. Formwork drawings shall bear the seal of a Professional Engineer registered in the state of New York.
2. Provide forms so that no discernible imperfection is in evidence in finished concrete surfaces due to deformation, bulging, jointing, or leakage of forms.

C. TOLERANCES

1. Comply with ACI 301, Chapter 4, Paragraph 4.3, except as otherwise noted.

D. PREPARATION OF FORM SURFACES

1. Comply with ACI 301, Chapter 4, Paragraph 4.4.
2. Use non-staining mineral oil or form lacquer.

3.02 REINFORCEMENT

A. Placing

1. Comply with ACI 301, Chapter 5, Paragraph 5.5. When splices not shown on the Drawings are approved by the Architect, such splicing shall conform to ACI 318.
2. Place reinforcing bars having assigned positions so that distinguishing marks agree with those given on the shop drawings relating to or calling for the bars.
3. Secure all reinforcing bars in place with high-density plastic supporting and spacing devices and metal tying devices.

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Reinforcing in concrete members that have one or more surfaces exposed, whether painted or unpainted finish, shall be tied with 14 gage soft annealed galvanized wire. Uncoated tie wire in exposed members will not be accepted.

- B. Restore damaged bars to full capacity in accordance with CRSI requirements and in a manner acceptable to the Architect.
- C. Minimum Reinforcement: Where no other reinforcement is shown for concrete fill or toppings, provide 6 by 6-W 1.4 by W 1.4 welded wire fabric.

3.03 MIXING CONCRETE

- A. Ready mixed concrete
 - 1. Comply with ASTM C94.
 - 2. Add mixing water only at the site.
 - 3. Discharge the concrete completely at the site within 1- 1/2 hours after the introduction of the cement to the aggregates. In hot weather reduce this time limit so that no stiffening of the concrete shall occur until after it has been placed.
 - 4. Begin the mixing operation within thirty minutes after the cement has been intermingled with the aggregates.
- B. Batch Mixing at Site
 - 1. Comply with ACI 301, Chapter 7, Paragraph 7.2.
 - 2. Excessive mixing requiring the addition of water to preserve the required consistency will not be permitted. Mix concrete to a consistency which can be readily placed without segregation.
 - 3. Where admixtures are specified, equip mixers with a device for measuring and dispensing the admixture.
- C. Hand-Mixed Concrete: When hand-mixed concrete is allowed and approved for certain parts of the work, mix on watertight platforms. Proportion cement, sand and aggregate loose by volume, carefully measured. Thoroughly mix sand and cement together dry until the mixture is of uniform color. Add the aggregate and turn the mass over until the mixture is uniform and

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homogeneous. Add water by sprinkling and turn the mass over until it is uniformly mixed and of the required consistency.

- D. Retempering: Retempering of the mix with water is not permitted.
- E. Redosage: Redosage with the specified high-range water-reducing admixture (superplasticizer) may be done with the prior approval of the structural Engineer regarding dosage and time periods.

3.04 JOINTS AND EMBEDDED ITEMS

A. Construction Joints

- 1. Comply with ACI 301, Chapter 6, Paragraph 6.1.
- 2. When construction joints are required or permitted, obtain bond by roughening the surface of the concrete in a manner which will expose the aggregate uniformly and will not leave laitance, loosened particles of aggregate or damaged concrete at the surface. Dampen the cleaned surface and apply a bonding grout. The bonding grout shall be composed of one part portland cement, 1.5 parts fine sand, the bonding admixture "SBR Latex" by The Euclid Chemical Co., and water at a 50:50 ratio and mix to achieve the consistency of thick paint. Place new concrete before grout has attained its initial set. Clean horizontal construction joints and pour the cement-sand mortar over joints in walls to a depth of 1 in. before depositing concrete. In walls, do not space construction joints more than 40 ft. apart, unless otherwise shown in framed slabs and beams. Do not space construction joints more than 60 ft. apart.

B. Embedded Items

- 1. Comply with ACI 301, Chapter 6, Paragraphs 6.4 and 6.5.
- 2. Accurately set anchorage devices by line and transit, and coordinate the location of all anchorage devices to be set for the accommodation of the superstructure and work of other trades.
- 3. Locate anchor bolts, beam/girder supporting plates and their studs to Foundation walls as shown on the Drawings

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and on shop drawings. Obtain necessary templates from the mechanical trades as required for the proper setting of anchor bolts and other items for mechanical equipment, as required.

4. Assist other trades in the installation of piping, pipe sleeves, conduit and similar items where such items are to be installed in concrete. Provide frames to securely hold anchor bolts and anchorage devices in place during construction, and take care that no displacement occurs during the pouring of concrete. Under this Section furnish and set items not furnished by other trades using approved standard type items suitable for their intended purpose.

3.05 PLACING CONCRETE

- A. Preparation Before Placing: Conform to ACI 301, Chapter 8, Paragraph 8.1.
- B. Conveying
 1. Comply with ACI 301, Chapter 8, Paragraph 8.2.
 2. Provide a spout or downpipe and elephant trunk or other appropriate method to prevent concrete from falling freely from a height greater than 3 ft.
 3. For pumped concrete, comply with ACI 304, Chapter 9. Use the specified HRWR admixture.
- C. Depositing: Comply with ACI 301, Chapter 8, Paragraph 8.3.

3.06 CURING

- A. Comply with ACI 301, Chapter 12.

3.07 FORM REMOVAL

- A. Do not remove forms until the concrete has thoroughly hardened and has attained sufficient strength to support its own weight and construction live loads to be placed thereon, without damage to the structure. In general, do not disturb forms for framing until concrete has attained at least 40% of design strength for side forms and 80% of design strength for bottom forms. Be responsible for proper form removal and replace any work damaged due to inadequate maintenance or improper or premature form removal.

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- B. Where use of metal form ties extending to within less than 1-1/2 in. of the face of permanently exposed concrete has been unavoidable, cut off such ties at least 1-1/2 in. deep in the concrete, but not less than 72 hours after concrete has been cast. Remove forms by methods which will not spall the concrete or cause any injury whatsoever. Hammering or prying against concrete will not be permitted.

3.08 PATCHING/REPAIR

- A. Comply with ACI 301, Chapter 9. Use an approved bonding compound.
- B. Remove and replace concrete that, in the Architect's opinion, does not satisfy the requirements of the Contract Documents if repair cannot be accomplished to the Architect's satisfaction.
- C. Submit a procedural outline of the proposed repair work, including a description of materials, preparation, sequencing, etc. for the Architect's information.
- D. Use expansive cements and epoxy type bonding agents to produce repair with strength, elasticity and durability characteristics compatible with the parent material being repaired.

3.09 FINISHING

- A. General Requirements for Flatwork: Strike-off top surfaces of all flatwork true and level to the required tolerances. Use construction techniques such as adjustment of pour size, adjustable screeds, shoring and other appropriate means to ensure compliance with these requirements. Deflections of structural steel and metal deck due to wet weight of concrete and structural steel camber is shown on the Drawings. Provide concrete, in addition to scheduled nominal slab thickness, to allow for the deflections and camber and provide finished slabs level within the specified requirements. Monitor and survey pour areas prior to, during and after concreting operation. Where final survey indicates non-compliance with flatness tolerances, provide permanently bonded corrective work to satisfy tolerance and finish requirements of the Contract Documents.
- B. Troweled Finish: Level surface and remove excess laitance by tamping, screeding, and preliminary wood floating. When the slab has hardened sufficiently so that water and fine material will not be worked to the top, compact the surface with motor-driven floats of the disc type. During the floating operations continually check the flatness of the slab with a 10 ft. straightedge. Cut down high spots and fill low spots. Trowel smooth with two steel troweling operations. Do the second troweling after the concrete has

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become so hard that no mortar will adhere to the edge of the trowel, and exert heavy pressure to thoroughly compact the surface. Leave floors with a smooth, hard finish free of blemishes and true to a F_K/F_L20 tolerance as per ACI 302-89. Trowel finish surfaces scheduled to receive the following:

1. Resilient flooring.
2. Adhesive-set ceramic tile.
3. Carpeting.
4. Where no other finish is specified.

C. Float Finish: Level surface and remove excess laitance by tamping, screeding, and preliminary wood floating. When the slab has hardened sufficiently so that water and fine material will not be worked to the top, compact the surface with motor-driven floats of the disc type. During the floating operations continually check the flatness of the slab with a 10 ft. straightedge. Cut down high spots, fill low spots and leave floors with a smooth finish and true to a F_F20/F_L17 tolerance as per ACI 302-89. Float finish surfaces scheduled to receive the following:

1. Membrane waterproofing.

D. Unfinished Slab Finish: Tamp the concrete using special tools to force the aggregate away from the surface, then screed with straightedges to produce a true and uniform surface as specified herein. Provide unfinished rough slab finish surfaces scheduled to receive the following:

1. Ceramic tile (except adhesive-set).
2. Quarry tile.
3. Floor topping.
4. Insulation.
5. Terrazzo.
6. Concrete fill.

E. Broomed Finish: Tamp the concrete using special tools to force aggregate away from the surface, then screed with straightedges to bring surfaces to the required lines. While the concrete is still green, wood float to a true and uniform plane with no coarse aggregate visible, and apply a broom finish, in the direction indicated. Broom finish the following:

1. Driveway.
2. Loading dock drive slabs.

END OF SECTION

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SECTION 05516

METAL PAN STAIRS (GENERAL CONSTRUCTION #2)

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. Work of this Section shall be governed by the Contract Documents. Provide materials, labor, equipment and services necessary to furnish, deliver and install all work of this Section as shown on the drawings, as specified herein and/or as required by job conditions.
- B. The Work shall include, but is not limited to the following:

1. Metal Stairs

- a. Metal pan treads, risers and platforms.
- b. Stringers, angle brackets, stair treads and platform supporting elements.
- c. Struts, hangers, headers.

2. Field and shop welding.

3. Miscellaneous components.

4. Anchoring means and methods.

5. Shop applied prime coats.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03303: Cast-in-place concrete

A. Section 05120: Structural steel.

B. Section 05300: Metal deck.

C. Section 05520: Handrails, railings and guardrails

D. Section 09250: Gypsum drywall

E. Section 09900: Painting

1.03 QUALITY ASSURANCES

A. Fabricator/Installer Qualifications

- 1. The fabricator/installer shall be recognized in the trade as one who has been continuously in the business for not less than ten (10) years, and to have performed work of a similar nature outlined hereafter, and shall furnish a list of five (5) projects successfully completed for acceptance. The firm shall possess adequate and proper equipment for the full and complete prosecution of the requirements covering the work outlined in these Specifications and indicated on the drawings.
- 2. Professional, qualified engineer, licensed to practice in the State of New York.

B. Performance Criteria

Metal Pan Stairs(GC #2)
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1. Design, engineer, fabricate and install the metal pan stairs, handrails and railings to withstand the following structural loads without exceeding the allowable design working stress of the materials for handrails, railing systems, anchors, and connections. Apply each load to produce the maximum stress in each of the respective components comprising handrails and railing systems, and to comply with requirements of ASTM E-985 for structural performance based on testing performed in accordance with ASTM E-894 and E-935.
2. Metal Pan Stairs
 - a. Fabricate metal stairs including landings in strict accordance with the following requirements:
 - (1) Treads and landings shall be capable of withstanding a uniform load of 100 pounds per square foot and a concentrated load of 300 pounds placed in a position which would cause the maximum stress.
 - b. Work shall conform to OSHA regulations, latest amendments.
- C. Quality welding processes and welding operations in accordance with:
 1. AWS D1.1, Structural Welding Code - Steel
 2. Certify that each welder employed in unit of Work of this Section has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- D. Reference Standards
 1. American Society for Testing and Materials (ASTM)

ASTM A-36	Structural Steel
ASTM A-47	Ferritic Malleable Iron Casting
ASTM A-48	Gray Iron Castings
ASTM A-53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded & Seamless
ASTM A-283	Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A-307	Carbon Steel Bolts and Studs
ASTM A-366	Sheet Steel, Carbon Cold-Rolled Commercial Quality
ASTM A-446	Sheet Steel, Zinc Coated (Galvanized) by the Hot-Dip Process Structural Quality
ASTM A-500	Cold Formed, Welded and Seamless Tubing
ASTM A-563	Carbon and Alloy Steel Nuts
ASTM A-568	Sheet, Carbon, High Strength, Low-Alloy Hot or Cold Rolled

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- ASTM A-569 Steel, Carbon, Hot-Rolled Sheet and Strip Commercial Quality
 - ASTM A-575 Steel Bars, Carbon Merchant Quality
 - ASTM A-611 Sheet Steel, Carbon Cold-Rolled Structural Quality
 - ASTM E-488 Strength of Anchors in Concrete and Masonry
 - 2. National Association of Architectural Metal Manufacturers (NAAMM)
Metal Stairs Manual
 - 3. Structural Steel Painting Council (SSPC)
 - 4. American Welding Society (AWS)
AWS Code D1.1 Welding Code
 - 5. Federal Specifications (FS)
 - FS FF-B-575 Machine Bolts
 - FS FF-P-645 Shop Primer
 - FS FF-S-92 Machine Screws
 - FS FF-S-325 Drilled-in Expansion Anchors
 - FS FF-W-84 Lock Washers
 - FS FF-W-92 Plain Washers
 - 6. Occupational Safety & Health Administration (OSHA)
 - 7. American Institute of Steel Construction (AISC)
 - 8. American National Standards Institute (ANSI)
ANSI B18.2.1 Lag Bolts
- 1.04 SUBMITTALS

- A. The Samples and Certificates listed below are required to be submitted by the Contractor to the Architect, for review. An omission of an item or items does not relieve the Contractor from this responsibility, and for compliance with the Contract Documents, of which this is a part.

SAMPLES

Item No.	Quan.	Size	Description
S1	5	9" x 9"	Welded connection between pipe members

All samples shall be primed with welded and ground smooth connections.

NOTARIZED CERTIFICATES OF COMPLIANCE

Item

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No.	Description	Standards
C1	Welding	American Welding Society
C2	Heavy gauge steel	ASTM A-36
C3	Light gauge steel	As specified
C4	Bolts and nuts	ASTM A-307
C5	Machine screws	FS FF-S-92a
C6	Shop paint	As specified
C7	Shop painting requirements	As specified

B. Shop Drawings

1. Submit shop drawings to the Architect for review in accordance with the requirements of the Contract Documents prior to fabrication and installation.
2. Shop drawings shall include plans, sections and details, noting gauges, materials, dimensions, anchoring devices and other attachment methods. Provide floor elevations at each level.
3. For pan stairs note sections through treads, risers, platforms, transfer paths, clearly noting stringers, carrying angles, rod hangers, angles and supporting and fastening components.
4. Clearly indicate the adjoining and abutting work which is to be performed by other trade contractors.

C. Submit product data and catalog cuts for manufactured items.

D. Submit qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, and other information specified.

E. Certification of welders in passing AWS testing.

F. Engineering Calculations

1. Submit for review engineering calculations on 8-1/2" x 11" sheets which shall conform to the design criteria established herein. Calculations shall be in accordance with standard engineering practice and the procedures and methods used by this trade Contractor in designing this work.
2. Each calculation sheet shall be stamped and signed by a registered qualified engineer, licensed by the State of New York.

1.05 DELIVERY, STORAGE & HANDLING

- A. Deliver materials to the site ready for use in the manufacturer's original and unopened containers and packaging, bearing labels as to type of materials, brand name, and manufacturer's name. Delivered materials shall be identical to the reviewed submittals.
- B. Remove materials which are damaged or otherwise not suitable for installation from the job site and replace with acceptable materials.

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PART 2 - PRODUCTS

2.01 MATERIALS

A. General

1. Metal shall be free from defects impairing strength, durability or appearance, and the best commercial quality for purposes specified. Metals shall be new materials and made with structural properties to safely sustain or withstand stresses and strains to which normally subjected. Members, true to detail, clean and straight with curved work true to radii with smooth finished surfaces.
2. For the fabrication of metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes.

B. Metals

1. Heavy gauge steel members shall generally be standard rolled shapes and sections conforming to ASTM A-36.
2. Light gauge steel members shall be cold-rolled, bent up or formed shapes where shown shall be fabricated from sheets conforming to ASTM A-366, A-611, A-568.
3. Hot-rolled carbon steel bars and rods: ASTM A-575, Grade as selected by fabricator.
4. Steel plates to be bent or cold-formed: ASTM A-283, Grade C.
5. Hot-rolled carbon steel sheets and strips: ASTM A-568 and A-569; pickled and oiled.
6. Steel tubing cold formed welded and seamless tubing conforming to ASTM A-500 Grade B.
 - a. 1" x 1" square x .083 inch wall thickness.

- C. Steel pipe shall conform to ASTM A-53, Type Grade A, Schedule 40, as follows and as noted.

<u>Nominal Pipe Size</u>	<u>Outside Diameter</u>	<u>Wall Thickness</u>
1"	1.315"	0.133"
1-1/4"	1.660"	0.140"
1-1/2"	1.900"	0.145"

D. Fasteners and Anchors

1. Standard bolts: ASTM A-307, Grade A, regular hexagon head.
2. Lag bolts: ANSI B18.2.1, square head type.
3. Machine screws: FS FF-S-92, cadmium plated steel.
4. Plain washers, round carbon steel: FS FF-W-92.
5. Lock washers, helical springs: FS FF-W-84.

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6. Machine bolts: FS FF-B-575.
 7. Nuts: ASTM A-563.
 8. At drywall locations provide metal spacers to prevent crushing of the surface.
 9. Anchors
 - a. Threaded-type concrete inserts shall be galvanized ferrous castings, internally threaded to receive 3/4 inch diameter machine bolts; either malleable iron complying with ASTM A-47 or cast steel complying with ASTM A-27 and hot-dip galvanized in compliance with ASTM A-153.
 - E. Steel plates, shapes and bars shall conform to ASTM A-36.
 - F. Castings
 1. Grey iron as per ASTM A-48, Class 30.
 2. Malleable iron as per ASTM A-48, Class 32510.
 - G. Welding rods and bare electrodes, selected in accordance with the AWS specification for the metal alloy to be welded.
 - H. Shop Paint
 1. Shop primer for ferrous metal: Manufacturer's or fabricator's standard, fast-curing, lead-free, universal modified alkyd primer selected for good resistance to normal atmospheric corrosion, for compatibility with finish paint systems indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure complying with performance requirements of FS TT-P-645.
 - a. Paint shall be VOC compliant and conform to restrictions and regulations having jurisdiction.
- 2.02 FABRICATION
- A. General
1. The Work included herein shall be representative of the highest standard of construction and shall be fabricated and erected by a firm specializing in Work of this character; generally in conformity with the recommended practices and applicable standards of the "Metal Stair Manual" of the National Association of Architectural Metal Manufacturers, and OSHA Rules and Regulations.
 2. Design steel framing to conform to various materials to be used and fit to Work of other trades. Provide necessary struts, hangers, angles, bearing plates, similar items required to securely support the work.
 3. Metal surfaces for the fabrication of metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes and including zinc coatings.

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4. Where recess, pockets, holes or other provisions are required to be made in the work of other trades, provide templates and/or setting drawings to assure that they will be properly formed and located. Furnish information sufficiently in advance, to avoid delay.
5. Preassemble items in the shop to the greatest extent possible to minimize field splicing and assembly of units at the site. Disassemble units only to the extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
6. Castings shall be carefully made, straight, true to mould, with smooth surfaces, clean-cut sharp arrises, with intersections well defined, free from blowholes, shrinkage defects, cracks or other injurious defects.
7. Securely and neatly weld and grind smooth joints or bring together with dowels, screws or countersunk rivets and dress flush. Dress surfaces smooth and free from mill marks or imperfections.

B. Welding

1. Comply with AWS for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of the exposed side. Clean exposed welded joints on all welding flux, and dress on all exposed and contact surfaces. Grind exposed welds to match adjacent contours and finish to match adjacent finish.
2. Provide fully welded assemblies, unless otherwise indicated. Use type and alloy of filler metal and electrodes as required for color match, strength and compatibility of materials being joined. Weld corners and seams continuously.
3. Exposed Connections
 - a. Undercut metal edges at surfaces to be welded.
 - b. Grind exposed welds flush and dress smooth to match and blend with adjoining surfaces, so that joints will not be visible.
4. Remove splatter and oxides from all welded surfaces.

C. Shop Paint - Rust Inhibitive Prime Coats

1. Shop paint, except those members or portions of members to be embedded in concrete or masonry or surfaces and edges to be field welded, unless otherwise specified.
2. Remove scale, rust and other deleterious materials before the shop coat of paint is applied. Clean off heavy rust and loose mill scale in accordance with SSPC SP-3 "Power Tool Cleaning". Remove oil, grease and similar contaminants in accordance with SSPC SP-1 "Solvent Cleaning".
3. Comply with requirements of SSPC-PA1 "Paint Application Specification No. 1" for shop painting.
 - a. Stripe paint all edges, corners, crevices, bolts, welds, and sharp edges.

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4. Apply one shop coat of metal primer paint to fabricated metal items, except apply 2 coats of paint to surfaces which are inaccessible after assembly or erection.
5. Brush or spray on metal primer, at a rate to produce a uniform dry film thickness of 2.0 mils for each coat. Provide full coverage of joints, corners, edges and exposed surfaces.

2.03 METAL PAN STAIRS

- A. Construct stairs to shapes, sizes and gauges of metal as specified and indicated on the drawings. Include anchors, nuts, washers, rods, angles, supports, and other accessories necessary for complete assembly and installation.
- B. Stringers shall be structural members conforming to profiles and sizes noted, closed terminal ends at landings, continuous around platforms. Field joints in strings shall be joined to continuous fillet welding, ground smooth and flush.
- C. Angle brackets shall be provided with level-cut ends. Each angle bracket supporting risers and treads shall be welded to the stringers.
 1. Size: 1-1/2 inch x 1-1/2 inch x 16 gauge.
- D. Risers and sub-treads: 12 gauge hot rolled steel sheets, with adjoining risers and tread pan integrally formed as detailed. Bend bottoms of risers to form key for cement finish. Wherever possible, locate nuts within cement fill threads or platforms. Upturn riser to form nosing of stair as noted. Tack weld welded wire mesh into each stair pan.
- E. Pans for sub-platforms shall be 12 gauge hot rolled steel sheets with integrally formed reinforcing angle ribs. Connect pans to angle brackets and headers at 6" intervals. Cut stringers and pans at platform and weld in place to conform to the encountered conditions. Weld and grind smooth and flush all joints. Tack weld welded wire mesh into the platform pans.
- F. Struts, hangers, platform headers and subframing: Provide supports as detailed, including struts, clip angles, angles or hangers which are required and necessary for the proper support of the steel stair construction. Supports shall be of size suitable for the supported load. Rods not smaller than 3/4" diameter. Struts, angles and hangers shall be supported by and directly connected to the structural framing.
 1. Design and size hanger and platform supporting devices to fit within the stair enclosing walls.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Furnish setting drawings, diagrams, templates, instructions and directions for the installation of anchorages, such as concrete inserts, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate the delivery of such items to the project site.

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3.02 EXAMINATION

- A. Study the Contract drawings and specifications with regard to the work as shown and required under this Section so as to insure its completeness.
- B. Examine surfaces and conditions to which this work is to be attached and notify the Architect if conditions or surfaces exist which are detrimental to the proper and expeditious installation of the work. Starting on the work shall imply acceptance of the surfaces and conditions to perform the work as specified.
- C. Verify dimensions taken at the job site affecting the work. Bring field dimensions, which are at variance to the attention of the Architect. Obtain decision regarding corrective measures before the start of installation.
- D. Cooperate in the coordination and scheduling of the work of this Section with the work of other Sections so as not to delay job progress.

3.03 INSTALLATION - GENERAL

- A. The finished work shall be strong, rigid, neat in appearance and free from defects, the members clean cut, straight and true. Properly lay out and space between terminals, so that there is no "cut-off" or other uncertain finish or ending.
- B. Perform shimming using non-ferrous and non-corrosive metal or fiber shim stock. Material subject to deterioration will not be permitted.
- C. Where recesses, pockets, holes or other provisions are required to be made in the work by other trades, provide templates and/or setting drawings to assure that they will be properly formed and located. Furnish such information sufficiently in advance to avoid delay in the construction progress.
- D. Accurately locate and erect the work in a plumb and level manner at the designed lines and elevations, and in true planes. Check positioning of members carefully to produce continuity of line and design.
- E. Field Welding
 - 1. Perform welding using qualified welders and equipment using procedures complying with the applicable current standards, specifications and codes of the American Welding Society. Welds shall be continuous except where spot-welding is permitted. Where exposed, grind welds to a smooth surface. Remove excess flux from the work at the completion of welding operation.
- F. Execute shimming where required using non-ferrous and non-corrosive metal or fiber shim stock; compressible material subject to deterioration will not be permitted.
- G. Locate and erect work plumb and level at the designed lines and profiles and in true planes. In all cases, check positioning of members to produce continuity of line and design.
- H. Securing to Other Work
 - 1. Do all cutting, drilling and fitting and work of similar character required in fitting and setting the materials in place.

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2. Install connecting members, bolts, anchors, etc., which are to be covered with masonry by the Contractor as far as practicable as the work progresses, so as to avoid cutting and drilling.
 3. Paint ferrous metal in contact with dissimilar metals or concrete or mortar with a coat of bituminous paint before installation.
 4. Execute connections to concrete for clip angles, rod hangers and other supporting devices using proper type expansion sleeves and bolts. Provide hanger devices for intermediate platforms with double nutted connections and lock washers to assure an accurate and plumb installation.
- I. The installed work shall be accurately installed, properly spaced out, between runs. Vertical members shall be plumb, surfaces shall be uniform without dents, gouges, bends or distortions. Finished work shall be strong, rigid and secure, neat in appearance and free from defects.
- 3.04 ADJUSTING AND CLEANING
- A. Protect installed work using adequate and suitable means during and after installation until accepted.
 - B. Repair, remove and/or replace surfaces which become scratched, bent or damaged in any way.
 - C. Shop primed paint surfaces which have become scratched, chipped or damaged during the installation, and areas around welds and other surfaces which were not shop primed, shall be touched up in the field using the same material and in the same dry film thickness as specified herein for the shop applied coat.

END OF SECTION

Baruch Academic Complex
Baruch College - Site B
New York, NY
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SECTION 07256

SPRAY APPLIED FIREPROOFING (REPAIRS BY GC #2)

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. Work under this Section shall be governed by the Contract Documents. Provide materials, labor, equipment and services necessary to furnish, deliver and install all work of this Section as shown on the drawings, as specified herein, and/or as specified by job conditions.
- B. The Work shall include, but is not limited to the following:
 - 1. Preparation of substrates.
 - 2. Cementitious sprayed applied fire-resistant material.
 - 3. Submit test data, literature and samples.
 - 4. Protection and cleaning.
 - 5. Patch all spray applied fireproofing, damaged as a result of work performed under this contract.
 - 6. Allow for additional 15,000 SF of spray applied fireproofing.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 05120: Structural steel.
- B. Section 05310: Metal deck.
- C. Section 09250: Gypsum drywall.

1.03 QUALITY ASSURANCES

- A. Single source responsibility: Obtain cementitious sprayed-on fireproofing materials from a single manufacturer for each different product required.
- B. The installer of the fireproofing shall be licensed, qualified, experienced and approved by the manufacturer to apply the fireproofing materials as specified and shall have been in continuous business for not less than the past five (5) years. Applicator shall provide in writing, names of previous comparable types and size applications successfully completed on time.
- C. Testing Agency
 - 1. Testing laboratory qualifications: To qualify for acceptance, an independent testing laboratory must demonstrate to Architect's satisfaction, based on evaluation of laboratory-submitted criteria conforming to ASTM E-699, that it has the experience and capability to conduct satisfactorily the testing indicated without delaying the progress of the Work.
 - 2. Inspection and testing shall be carried out to ensure that the applied thickness and density meets the fire rating requirements, and to verify that the installation meets the reviewed test reports. Initial inspection and testing shall be paid for by Owner.

Spray Applied Fireproofing
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3. Correct unacceptable work and pay for further testing required to prove acceptability of the installation.
4. Patch test areas as required to re-establish the fireproofing integrity.

D. Performance Criteria

1. The sprayed fireproofing shall have been tested by Underwriters' Laboratories, Inc. in accordance with ASTM E-119. Protect structural steel members except those encased in concrete with adequate fireproofing thickness and densities to provide the following fire resistance ratings:
 - a. Floor construction including beams..... 2 hours
 - b. Intermediate beams, purlins and metal deck..... 2 hours
 - c. Roof construction - metal deck, beams..... 1-1/2 hours
 - d. Columns
 - (1) Supporting one floor or roof..... 2 hours
 - (2) Supporting more than one floor..... 3 hours
 - (3) Exposed structure in the following rooms... 3 hours
 - Scene Shop
 - Fuel Tank Room
 - Loading Dock
2. Materials to be applied in accordance with ASTM E-84 and so listed and classified.
3. Dry density: The field density shall be measured, in accordance with ASTM Standard E-605. Minimum average density shall be that listed in the UL Fire Resistance Directory, ICBO Evaluation Report as required by the authority having jurisdiction or shall have a minimum average of 15 psi.
4. Deflection: When tested in accordance with ASTM E-759, the material shall not crack or delaminate when the non-concrete topped galvanized deck to which it is applied is subjected to a one time vertical centerload resulting in a downward deflection of 1/120 of the span.
5. Bond impact: Material subject to impact tests in accordance with ASTM E-760 shall not crack or delaminate from the surface to which it is applied.
6. Cohesion/adhesion (bond strength): When tested in accordance with ASTM E-736, the material applied over uncoated or galvanized steel shall have an average bond strength of 150 psf (9.5 kPa).
7. Air erosion: When tested in accordance with ASTM E-859, the material shall not be subject to losses from the finished application greater than 0.025 grams per sq. ft. (0.27 grams per square meter).

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8. Compressive strength: The fireproofing shall not deform more than 10 percent when subjected to crushing forces of 750 psf (35.9 kPa) when tested in accordance with ASTM E-761.
9. Corrosion resistance: Steel with applied fireproofing shall be tested in accordance with ASTM E-937 and shall not promote corrosion of steel.
10. Abrasion resistance: No more than 22 cm³ shall be abraded or removed from the fireproofing substrate when tested in accordance with the test methods developed by the City of San Francisco, Bureau of Building Inspection, and required by the U.S. Navy (USNFAC).
11. The material shall have been tested and reported by Underwriters Laboratories, Inc. (UL) in accordance with the procedures of UL 263 (ASTM E-119).
12. Noncombustibility: When tested in accordance with ASTM E-136, the material shall be noncombustible.
13. Impact penetration: The fireproofing material shall not show a loss of more than 6 cm³ when subjected to impact penetration tests in accordance with the test methods developed by the City of San Francisco, Bureau of Building Inspection, and required by the U.S. Navy (NAVFAC).
14. Surface burning characteristics: Material shall exhibit the following surface burning characteristics when tested in accordance with ASTM E-84:
 - a. Flame Spread..... 0
 - b. Smoke Development..... 0
15. Friability: Material shall be assigned a low friability rating as previously determined by the General Services Administration.
16. Resistance to mold: The fireproofing material shall be formulated at the time of manufacturing with a mold inhibitor. Fireproofing material shall be tested in accordance with ASTM G-21 and shall show resistance to mold growth when inoculated with aspergillus niger and mixed spore cultures (Tappi T487-M54 and ASTM G-21-80).
17. Hardcoat/Fireproofing
 - a. Performance Characteristics

Physical Properties	Values	Test Method
Dry Density	39-41 PCF	ASTM E-605
Bond Strength	10000 PSF	ASTM E-736
Compressive Strength @ 10% Deformation	550 PSI	ASTM E-761
Hardness	40	ASTM D-2240
 - b. The above performance characteristics are based on a particular manufacturer. Performance may vary for another manufacturer specified.

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C. Locations

- (1) Loading dock.
- (2) Exterior entrances where noted.
- (3) Gymnasium Room B2-100.
- (4) Stair transfer areas where the ceiling height is below 7'-6" above the finished floor.
- (5) And as noted.

E. Codes and Regulations

1. This specification shall be supplemented by the applicable requirements of the Building Code and all authorities having jurisdiction. Conflicts and/or discrepancies between contract documents, ordinances, etc. noted by this Trade Subcontractor shall be brought to the Architect's attention.

F. Reference Standards

1. American Society for Testing and Materials (ASTM)

ASTM E-84	Surface Burning Characteristics of Building Materials
ASTM E-119	Fire Tests of Building Construction and Materials
ASTM E-136	(Noncombustibility) Behavior of Materials in a Vertical Tube Furnace @ 750° C.
ASTM E-605	Thickness and Density of Sprayed Fire-Resistive Material Applied to Structural Members
ASTM E-736	Cohesion/Adhesion of Sprayed Fire-Resistive Material Applied to Structural Members
ASTM E-759	Effect of Deflection of Sprayed Fire-Resistive Material Applied to Structural Members
ASTM E-760	Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members
ASTM E-761	Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members
ASTM E-859	Air Erosion of Sprayed Fire-Resistive Material Applied to Structural Members
ASTM E-937	Corrosion of Steel by Sprayed Fire-Resistive Materials Applied to Structural Members
ASTM G-21	Standard Test Method to Evaluate Resistance of Synthetic Polymer Materials to Fungi

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2. Federal Specification (FS)
 - SS-S-111B Sound Controlling Materials (Trowel and Spray Applications)
 3. U.S. Military Specification (MIL)
 - MIL-E-5272C Humidity Test, Procedure III
 4. Uniform Building Code Standard (UBC)
 - No. 43-8 Thickness and Density Determination for Spray-Applied Fireproofing
 5. Underwriters' Laboratories, Inc. (UL)
 - Fire-Resistance Directory
 - Building Materials Directory
 6. U.S. Occupational, Safety and Health Act (OSHA)
 7. AWCi Publication
 - Inspection Procedure for Field Applied Sprayed Fire-Resistive Material
- G. Mock-Up
1. Apply typical sample section of not less than ten (10 square feet to representative substrate on site for review and to establish requirements of fire ratings and finish texture. Comply with project requirements as to thickness, density of application, and fire rating.
 2. Examine installation within one hour of application to determine variance due to shrinkage, temperature, and humidity. Where shrinkage and cracking are evident, adjust mixture and method of application as necessary.

1.04 SUBMITTALS

- A. The Samples and Certificates listed below are required to be submitted by the Contractor to the Architect for review. An omission of an item or items does not relieve the Contractor from this responsibility, and for compliance with the Contract Documents, of which this is a part.

SAMPLES

Item No.	Quan.	Size	Description
S1	5	3-1/2" x 4-1/2"	Cured fireproofing material, each kind